

# Abstracts

## Oral 4

### Mortality studies

#### 04.1 SILICA DUST EXPOSURE AND NON-MALIGNANT RESPIRATORY DISEASE MORTALITY AMONG SILICOTIC WORKERS IN HONG KONG: EXPOSURE-RESPONSE ANALYSES

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**Introduction:** Exposure-response relations between silica dust exposure and mortality from non-malignant respiratory diseases (NMRD) have been reported in other places using duration of employment, levels of silica dust exposure, and cumulative exposure as exposure indices. The aim of this study is to examine the exposure-response relations between various indices of silica dust exposure and the mortality of NMRD among a cohort of 2789 silicotic workers in Hong Kong.

**Methods:** A simple job exposure matrix was developed for each industry and job task according to the documented concentrations of free respirable silica dust in Hong Kong. The geometric mean in local dusty jobs varied widely from 0.01 to 4.23 mg/m<sup>3</sup>, being highest among pneumatic drillers in underground caissons. The changes of exposure intensity with calendar year were not considered because of limited hygiene data. Exposure indices included duration of silica dust exposure, cumulative dust exposure (CDE), mean dust exposure (MDE), and radiological severity of silicosis. Cox's proportional hazard models were fitted to examine possible exposure-response patterns, using quartiles of CDE and MDE, and log linear, log square root, log quadratic, and power models, with adjustment for age at entry into cohort, smoking pack years, history of tuberculosis, and calendar year of first exposure. The changes of -2 ln likelihood were used to compare model fit between models. The standardised mortality ratio (SMR) was calculated using the Hong Kong general population rates as reference, with indirect adjustment for smoking using Axelson's method, in two occupational subgroups.

**Results:** 371 of the 853 deaths (43.5%) occurring during 1981-99 were from NMRD other than pneumonia and other infection diseases, giving an SMR of 8.48 (95% CI 7.64 to 9.39) and a smoking adjusted SMR of 5.89 (95% CI 5.31 to 6.52). Smoking adjusted SMR for caisson silicotics (17.73, 95% CI 15.03 to 20.76) was higher than that for non-caisson silicotics (4.04, 95% CI 3.52 to 4.61). The relatively high exposure levels of caisson silicotics (CDE: 12.84 mg/m<sup>3</sup>-years; MDC: 0.61 mg/m<sup>3</sup>) when compared to the non-caisson silicotics (CDE: 9.72 mg/m<sup>3</sup>-years; MDC: 0.35 mg/m<sup>3</sup>) could explain the higher SMR. Multivariate Cox's regressions showed a positive gradient between profusion of simple silicosis with the mortality risk of NMRD. Large opacities significantly increased NMRD deaths by 105%. The best fit in the multivariate Cox's regression analyses was achieved by using quartiles of MDC. A clear dose-response trend for NMRD mortality was found with MDC, while the association with CDE was less marked.

**Conclusion:** A clear dose-response trend was found between NMRD mortality and MDC or severity of silicosis in our cohort, and MDE could serve as a useful index for silica dust exposure when examining the mortality risk of NMRD among silicotic workers.

#### 04.2 CANCER MORTALITY AMONG SHIPYARD COASTGUARD WORKERS

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**Introduction:** In the retrospective cohort study mortality experience of 4702 (4413 men and 289 women) civilian workers in a US Coast Guard shipyard was evaluated in relation to different shipbuilding and repairing work tasks.

**Methods:** All workers employed at the shipyard between 1 January 1950 and 31 December 1964 were included in the study, and were

followed through 31 December 2001 for vital status. Exposure assessment included detailed shipyard and lifetime work histories found in the shipyard personnel records, job descriptions, changes in production and ventilation controls, and walk-through surveys. Workers were classified as exposed and non-exposed to any potential hazardous substances. In addition, 20 job groups were created based on likely similar exposures. Standardised mortality ratios (SMRs) were calculated based on the general population of the state and adjusted for age (5 year groups), calendar period (5 year categories), sex, and race.

**Results:** The follow up was successful for 93.3% of the workers. The study indicates an excess of mortality from respiratory cancers (SMR = 1.29; 95% CI 1.15 to 1.43), lung cancer (SMR = 1.26; 95% CI 1.12 to 1.41), and mesothelioma (SMR = 5.07; 95% CI 1.85 to 11.03) among men employed in the shipyard. A similar pattern was observed for the men exposed to hazardous substances. No increasing trend in mortality was found with duration of employment in the shipyard, except for mesothelioma (SMRs of 4.23 and 6.27 for less than 10 years and 10 years or more, respectively). Mesothelioma was elevated in most occupations. In occupations with at least three cases and with an SMR of  $\geq 1.3$ , we observed significantly increased mortality for lung cancer among machinists (SMR = 1.60) and shipfitters, welders, and cutters (SMR = 1.34), and oral and nasopharyngeal cancers among wood workers and helpers (SMR = 6.20).

**Conclusion:** An excess of mortality was observed from asbestos related diseases, particularly among shipyard workers exposed to hazardous substances, and lung cancer among machinists and oral/nasopharyngeal cancer among carpenters.

#### 04.3 COHORT STUDY OF MILITARY VETERANS EXPOSED TO CHEMICAL WARFARE AGENTS IN THE UK HUMAN VOLUNTEER PROGRAMME AT PORTON DOWN: PROGRESS REPORT

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**Introduction:** The UK government has carried out research into the effects of chemical warfare agents on military capability at Porton Down since 1916. Little is known about the effects of these exposures on the long term health of military veterans included in these tests. At EPICOH 2004, we reported results from a pilot study which found that studying mortality and cancer incidence in veterans taking part in tests between 1939 and 1989 would be feasible. We report on progress during the first 18 months of this cohort study and discuss some methodological issues encountered.

**Methods:** This historical cohort study includes (a) all those who participated in the human volunteer programme in 1939-89 ("PD veterans") and (b) military personnel who did not go to Porton Down ("control veterans"). Controls are selected using the service number of the PD veteran in order to achieve comparability in age, sex, branch of the military, military rank, and time period of military service. The expected size of each group is 20 000, giving a total study size of about 40 000. Exposure data are being abstracted for each Porton Down veteran and data linkages with the national mortality and cancer registers are underway.

**Results:** Up to the end of February 2005, personal identifiers for 15 384 Porton Down veterans and 8528 controls had been abstracted from the military archives (77% and 43% of the expected numbers, respectively) and overall 16 477 (41%) had been submitted for linkage with national registers. Methodological issues which have arisen include the definition of the human volunteer programme, presence of anonymous data in Porton Down records, missing identification data required for control selection and record tracing, missing personnel files from military archives, separate mortality registers for Scotland and Northern Ireland, and untraced individuals for reasons such as emigration. Analytical methods for this matched cohort study are being considered.

**Conclusions:** Cohort assembly is progressing well but has raised some specific methodological issues requiring special attention.

#### 04.4 RESPIRATORY SYMPTOMS AND DUST EXPOSURE IN A COHORT OF CALIFORNIA FARMERS

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**Introduction:** Agricultural dusts forming from California's generally arid climate and land cultivation practices present challenges to the respiratory health of farmers.

**Methods:** 620 (72%) of current UC Davis Farmer Health Study cohort members who were still working in 2004 were questioned about last year symptoms of asthma, persistent wheeze, chronic cough, and bronchitis. Exposures to a range of animal and crop tending tasks, previously associated with dust generation, were recorded in four ways: ever performed, number of years, performed last year, and number of days. From  $\chi^2$  analyses, significant ( $p < 0.05$ ) associations between incident symptoms (new symptoms/non-prevalent symptom in 1993) and exposures were assessed in multivariable logistic regression models adjusted for age and smoking status. As these symptoms can also

regress, an analysis was also conducted of change in symptoms with the same task exposures using generalised linear modeling.

**Results:** Mean age of farmers in 2004 was 62.4 (SD 11.6) years, range 36–94. 116 farmers reported current respiratory symptoms, but were symptom free in 1993 (when first contacted); 85 of these reported one, 22 reported two, and nine reported three symptoms. 8.4% (48/574) had incident persistent wheeze, 7.1% (42/596) new chronic bronchitis, 6.9% (41/596) new chronic cough, and 4.2% (25/573) incident asthma. New CC was associated with last year dust intensity, OR = 1.19 (95% CI 1.05 to 1.35) and with time working in dust OR = 1.02 (95% CI 1.003 to 1.028). New onset PW was significantly associated with years performing mechanical harvesting and number of days last year driving a tractor. Incident asthma was associated with days hand harvesting last year, CB with any hand harvesting last year, and CC with number of days performing maintenance shop work.

**Conclusions:** Incident respiratory symptoms still occurred in long time farmers and were associated with tasks which generated agricultural dusts, independent of age, years in farming, or smoking status.